Intern Home Assigment

Home Assignment: Food Segmentation and Area Calculation

Objective:

Design a scalable server-side application to:

1. **Detect and segment ONLY food items** in images using a machine learning model.
2. **Calculate the area** of each segmented food item in the image.
3. The application should be "hostable" on a server. (You are supposed to design the server(s) and also a corresponding client that sends request to it)

Requirements:

1. **Image Processing**: Process images to detect and segment food items.
2. **Area Calculation**: Compute and return the area of each segmented food item. Area = Area in the image.
3. **Scalability**: Bombard the server with at least 1000 images sent from clients all at once and design for horizontal/vertical scaling.

Tools:

1. Feel free to use tools (algorithms, packages, architectures, etc.) that you think are reasonable for this project
    - Mention your rationale behind choosing the particular tool in the report.

Deliverables:

- **Source Code**: Include a README with setup instructions.
- **Report (1-2 pages)**:
    - Approach to solving the problem.
    - Scalability strategy.
    - Challenges faced and potential improvements.

Guidelines:

- Use any language/framework.
- Pre-trained models are allowed.

- No UI required; focus on backend.
- Document your assumptions clearly.

Potential Workflow Diagram:

```
Image Input (Batch of 100)
       ↓
 Preprocessing (if required)
       ↓
Model Inference (e.g., YOLOv8)
       ↓
Segmentation and Food Detection
       ↓
Area Calculation
       ↓
Results Output (Food Item + Area)
```

Evaluation Criteria:

You will be judged based on the Functionality, Scalability and Performance, Code Quality and the Report.

LLM Usage:

The motivation for this assignment is to share a real world industry problem with you and understand your approach to it. We hope you are as excited to solve the problem as we are while designing it. While we do not discourage LLM Usage, we strongly DO NOT recommend submitting entire assignments completed by LLMs. Candidates who do that will be flagged. Be responsible and highlight in your report how you may (or may not) have used LLM to complete the work. Honesty will earn bonus points. :)

Be prepared to explain your solution. Good luck!